4:30 p.m.

### 879-3 The Effect of Intra Aortic Balloon Pumping on Coronary and Transmitral Flow

Ashraf W. Khir, Susanna Price, Michael Y. Henein, Kim H. Parker, John Pepper, *Royal Brompton Hospital, London, United Kingdom.*

Background: The Intra Aortic Balloon Pump (IABP) is the most widely used form of temporary cardiac assist. The effect of diastolic counter pulsation on left ventricular (LV) filling has not been investigated.
Methods: We recorded left anterior descending coronary artery and transmitral flow velocities in 20 patients in the intensive care unit, following coronary artery bypass surgery, using transesophageal Doppler echo approach. The pump (Datascope, 98XT) was set to full augmentation and the timing was adjusted for the inflation to start at the time of aortic valve closure and the deflation at the peak R wave of the electrocardiogram. Recordings were made at different pumping rates; 1:1, 1:2, 1:3, and when the pump was turned off, leaving a minimum of 5 minutes between recordings to allow for the return to basal values.
Results: Peak coronary diastolic flow velocities increased significantly with IABP 1:1 (25±6 %, p<0.001), 1:2 (22±4%, p<0.001), and 1:3 (20±4%, p<0.001) compared to its value with the pump turned off. LV early diastolic filling velocities, E wave, also increased significantly with IABP 1:1 (35±7%, p< 0.001), 1:2 (31±5 %, p<0.001), and 1:3 (28±4%, p<0.001) compared to its value with the pump turned off. The change in diastolic coronary flow velocity with 1:1 balloon pumping correlated closely with the change of the E wave velocity (r=0.74, p<0.001).
Conclusion: IABP significantly increases diastolic coronary flow and LV early diastolic filling velocities. Although the formal is epicardial and the latter is intracardial the close relationship between the two suggests an overall improvement in diastolic function with IABP.

4:45 p.m.

### 879-4 Initial and Prolonged Hemodynamic Effects of Intraaortic Balloon Support in Ventricular Septal Defect Complicating Acute Myocardial Infarction

Holger Thiele, Bernward Lauer, Enno Boudriot, Gerhard Schuler, *University of Leipzig - Heart Center, Leipzig, Germany.*

Background: Immediate surgical repair of ventricular septal defect (VSD) complicating acute myocardial infarction is associated with high mortality. Preoperative use of an intraaortic balloon pump (IABP) is routinely recommended to achieve hemodynamic stabilization, which permits preoperative diagnostic examinations or even delayed surgical repair. However, the hemodynamic effects of IABP support are deemed to be short lasting and therefore long-term support is not recommended.
Methods and results: An IABP was implanted preoperatively from 12/1997 to 09/2001 in 20 consecutive patients with infarct-related VSD (11 men, 9 women, mean age 70±11, range 46-89). Effective cardiac output (l/min), left-to-right-shunt (l/min) and the shunt flow ratio were calculated by the method of Fick pre and post intraaortic balloon counterpulsation and at daily follow-up with pump on and off in those undergoing delayed surgical repair (n=9). Effective cardiac output improved from 3.6±1.3 l/min to 4.2±1.3 l/min (p<0.001), left-to-right-shunt and shunt flow ratio were reduced from 7.3±3.5 and 3.1±0.9 l/min to 5.6±.3.3 and 2.5±0.7 l/min immediately after IABP insertion (both p<0.001), respectively. At follow-up hemodynamic improvements were sustained and no deteriorations occured. Mortality in patients with early (day 1-2) operation was 71% and with delayed surgery (day 8-25) 22% (p<0.05), respectively.
Conclusion: In patients with infarct related VSD IABP support provides an immediate and sustained hemodynamic improvement resulting in an enhanced effective cardiac output and a reduced left-to-right-shunt and shunt flow ratio. This results in hemodynamic stabilization in at least some patients, which may result in an improved outcome.

ORAL CONTRIBUTIONS

## 895 Heart Failure: Natriuretic Peptides

Wednesday, March 20, 2002, 10:30 a.m.-Noon
Georgia World Congress Center, Room 367W

10:30 a.m.

### 895-1 Plasma N-Terminal pro-BNP Predicts the Occurrence of Major Clinical Events in Severe Chronic Heart Failure: Results of a Substudy of the COPERNICUS Trial

Franz S. Hartmann, Gert Richardt, Milton Packer, Andrew J. Coats, Michael B. Fowler, Henry Krum, Paul Mohacsi, Jean L. Rouleau, Michal Tendera, Alain Castaigne, Matthias Baumann, Juergen Trawinski, Silke Horsch, Ildiko Amann-Zalan, Hugo A. Katus, *Universitaetsklinik Luebeck, Luebeck, Germany.*

Background: The measurement of cardiac natriuretic peptides has been proposed as a tool to monitor the progression of heart failure (HF), but its utility in this regard may be biased by changes in these peptides induced by changes in volume status.
Methods: Baseline plasma concentrations of NT-proBNP were measured using a newly developed sandwich ELISA in a subgroup of 844 men and 204 women with symptoms at rest or on minimal exertion who were enrolled in the European part of the COPERNICUS study and were randomized to placebo (PBO, n=524) or carvedilol (CRV, n=524) for up to 29 months. Values of NT-proBNP were markedly increased despite the requirement that patients be euvolemic before the start of treatment (mean ± SD = 579 ± 822 pmol/L, median = 323 pmol/L). By univariate and multivariate Cox regression, NT-proBNP (analyzed as a continuous or categorical variable) was found to be a powerful predictor of all-cause mortality and other major clinical events (see table), all P < 0.0001. Predictive value of NT-proBNP was similar when both PBO and CRV patients were analyzed separately.
Conclusions: Circulating levels of NT-proBNP predict all-cause mortality and major clinical events in patients with severe HF, even those who were clinically euvolemic.

**One-year event rates and risk ratios in PBO +CRV combined**

| | NT-proBNP <median | NT-proBNP >median | Risk ratio | 95% C.I. |
|---|---|---|---|---|
| All-cause mortality | 6.2% | 22.4% | 3.13 | 1.94-5.07 |
| All-cause mortality or hospitalization for any reason | 33.9% | 52.8% | 1.96 | 1.56-2.48 |
| All-cause mortality or cardiovascular hospitalization | 19.9% | 41.9% | 2.60 | 1.95-3.46 |
| All-cause mortality or hospitalization for heart failure | 16.4% | 40.3% | 3.11 | 2.27-4.27 |

10:45 a.m.

### 895-2 Head to Head Comparison of the Diagnostic Value of Bedside Measurement of B-Type Natriuretic Peptide and Echocardiography in Patients With Acute Dyspnea

Damien Logeart, Pascale Beyne, Pierre-Vladimir Ennezat, Carole Saudubray, Alain Cohen Solal, *Beaujon Hospital AP-HP, Clichy, France.*

**Background:** The cause of acute dyspnea may be difficult to establish in an urgent-care setting. The aim of this study was to compare the diagnostic accuracy of bedside measurements of B-Type natriuretic peptide (BNP) and Doppler echocardiography in this setting.
**Methods:** BNP was measured at admission by a rapid assay (Biosite Diagnostics, CA) before the onset of treatment, in 100 patients (70±2 years) presenting with severe dyspnea in an emergency department. Doppler-echocardiogram was performed at the same time. Results were withheld from clinicians and were compared to the initial diagnosis and to the final diagnosis retrospectively established at discharge by a college of physicians
**Results:** Final diagnosis was acute congestive left ventricular failure (CHF) in 72 patients, pulmonary disease in 20, pulmonary embolism in 6 and other cause in 2. At the emergency department, CHF was overestimated in 8 patients and non-diagnosed in 6. BNP concentrations were 398±32 pg/ml (55-1014) in CHF, 54±12 pg/ml (7-167) in pulmonary diseases and 147±72 pg/ml (9-390) in pulmonary embolism (p<0.01). Cut-off BNP value of 60 pg/ml was the most accurate for the diagnosis of CHF with negative and positive predictive values of 91 and 85% respectively. This low cut-off value led to overestimate the possibility of CHF and was due to low BNP levels (55 to 80 pg/ml) in 6 patients presenting with flash pulmonary edema with short delay (< 2 hours) before admission, preserved systolic function and no previous history of CHF. Doppler analysis of mitral inflow had negative and positive predictive values of 97 and 93% respectively, considering that "restrictive' or "normalized' patterns were associated with CHF in this elderly population. However, this analysis was possible in only 74 patients because of tachycardia, arrhythmia, pacing and 72 patients only were correctly diagnosed versus 88 patients with BNP.
**Conclusion**: Bedside echocardiography is more accurate than BNP to differentiate CHF from others causes in acute dyspnea. However, BNP appears as the most useful of the first-line diagnostic tools because mitral Doppler pattern is uninterpretable in numerous cases. BNP should be used with caution in flash pulmonary edema.

11:00 a.m.

### 895-3 Plasma BNP to Screen for Systolic Dysfunction in the Community: Importance of Using Age- and Sex-Specific Partition Values

Margaret M. Redfield, Richard J. Rodeheffer, Douglas W. Mahoney, Steven J. Jacobsen, John C. Burnett, Jr., *Mayo Clinic and Foundation, Rochester, Minnesota.*

**Background:** Studies suggest that systolic dysfunction (LVSD) is common in the community. If plasma BNP is to be used to screen for LVSD, the level of BNP which is considered abnormal (partition value) must be defined. As BNP is higher in females and increases with age in the absence of cardiovascular disease, age- and sex-specific partition values may be needed to optimize its performance. In the current study, we examined the sensitivity and specificity of BNP for detection of an ejection fraction (EF) ≤40% by age and sex in a population-based cohort. **Methods:** Randomly selected residents of Olmsted County, MN age ≥45 yrs (n=2042) underwent echo and measurement of BNP (Biosite® assay). **Results:** The value of BNP providing 75% specificity (BNP@75%Spec), the sensitivity/specificity (Sens/Spec) at that value and the area under the receiver operating curve (AUC) for detection of EF≤40% are shown for each age/sex strata (table, ND = no LVSD detected). 40 subjects (2.0%) had EF≤40%. We also examined the use of a single partition value (53 pg/ml) yielding 75% specificity in the entire population and evaluated it within each age/sex strata. In contrast to the age- and sex-specific partition values (table), use of the single partition value resulted in poor sensitivity in the youngest (25% Males; ND Females) and poor specificity (50% Males; 29%